

# **Assessment of Aquatic Habitats on BLM Lands of the Clark's Fork of the Yellowstone River**

**Prepared for Joe Platz, Miles City Bureau of Land Management  
by**

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**South Fork Bridger Spring upstream from SF Bridger Creek**



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Program**



## **BLM Clark's Fork Yellowstone (CFY) Aquatics Assessment**

Project goals of the MTNHP Aquatic Surveys of the BLM Clark's Fork Yellowstone 2007 aquatic sites: **1)** to sample and assess aquatic community integrity based on macroinvertebrate, fish and habitat sampling from "a priori" chosen aquatic sites in the area of interest (Table 1), **2)** to identify and interpret key community indicators found at the sites using standardized protocols and biotic thresholds, and compare these against reference condition standards at the watershed-level and local-reach scale.

### ***Habitat Evaluations.***

On-site habitat assessments were conducted using the rapid assessment protocol (RBP Level 1, scores 0-200) developed for the EPA by Barbour et al. (1999) with modifications and additions by the National Aquatic Assessment of the Bureau of Land Management (BLM) Buglab (scores 0-24) (<http://www1.usu.edu/buglab/forms/Bug%20Protocol%20form.pdf>). Using the BLM assessment protocols, the reach was divided into 10 equally spaced transects. Parameters recorded at each were: wetted width, bankfull width, 3 channel depth measurements, large woody debris and riparian shading. Basic water chemistry parameters (temperature, pH, conductivity, dissolved O<sub>2</sub>) were recorded prior to sampling using a Horiba H-10 water monitor. The goal of these evaluations is to characterize local reach geomorphology, riparian and in-stream habitat, and other characteristics that influence aquatic community integrity. The sites ranking higher using these protocols are determined to have higher quality local-scale habitat. Habitat assessments were performed during the same visit as the biological sampling.

### ***Fish Communities.***

Fish sampling in the foothill streams was conducted with a Smith Root Backpack Electroshocker Model #15-B following protocols outlined in EPA's RBP (Barbour et al. 1999). This required the positioning of upstream and downstream block nets at the ends of the reach (150m or 40x wetted width), but most of the time shallow sections and/or riffle areas were sufficient to prevent fish from escaping while the run & pool areas were being shocked. Fish sampling in the plains streams was conducted with 20 ft straight seines following protocols outlined in Bramblett et al. (2005). Fish captured using either method were transferred to holding buckets, identified to species, enumerated, examined for external anomalies (e.g. deformities, eroded fins, lesions, and tumors), and then released. Young-of-the-year fish less than 20 millimeters in length were noted on the field sheet (not included in the totals), and released. Voucher specimens were only taken in the case of uncertain field identifications.

Analysis of the prairie stream fish communities used Integrated Biotic Indices (IBI) (Bramblett et al. 2005) and derived Observed/Expected (O/E) Fish Models (Stagliano 2005) to detect impairment in the biological integrity of the sites. The IBI involved calculation of a series of metrics evaluating different attributes of the community. The metrics allowed calculation of an overall score between 0 and 100. Biological community integrity was calculated at the foothills stream sites using Fish (O/E), since IBIs have not been sufficiently developed for these mountain foothill streams and would rank impaired with the Prairie Fish IBI. Bramblett et al. (2005) did not propose threshold criteria for good, fair, and poor biological integrity for these scores. Therefore, we applied commonly used criteria. Scores of 75 to 100 indicate good to excellent biological integrity, 50-74 fair to good biological integrity, 25 to 49 indicated poor to fair biological integrity and scores <25% indicate poor biological integrity or severely impaired.

### ***Macroinvertebrate Communities:***

Macroinvertebrates were collected from 10 evenly spaced transects across the reach with a 500-micron D-frame net. The method utilized was the EMAP\_Reach-Wide Multi-habitat protocol outlined in Lazorchak (1998). All 10 samples taken within the designated transects were composited into a bucket, and the organisms were washed onto a 500-micron sieve, transferred to a 1 liter Nalgene bottle, labeled and preserved in 95% ethanol and brought to the MTNHP lab in Helena for processing.

**Table 3.** Impairment determinations from the MMI and O/E (RIVPACS) models (taken from Jessup 2005, Feldman 2006).

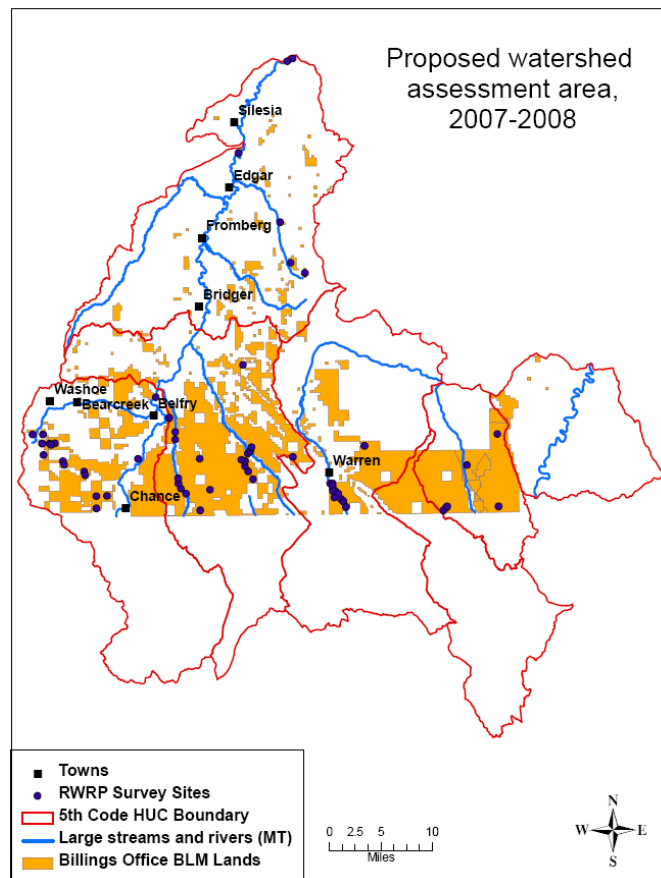
Ecoregion	RIVPACS	MMI	Impairment Determination
Mountain	$\geq 0.8$ or $\leq 1.2$	$\geq 63$	Not impaired
	$< 0.8$ or $> 1.2$	$< 63$	Impaired
Low Valley	$\geq 0.8$ or $\leq 1.2$	$\geq 48$	Not impaired
	$< 0.8$ or $> 1.2$	$< 48$	Impaired
Eastern Plains	$\geq 0.8$ or $\leq 1.2$	$\geq 37$	Not impaired
	$< 0.8$ or $> 1.2$	$< 37$	Impaired

These samples were processed (sorting, identification, and data analysis) by David Stagliano at the Helena NHP lab following MT Department of Environmental Quality's protocols (MT DEQ 2005). Macroinvertebrates were identified to the lowest taxonomic level, imported into EDAS (Jessup 2006), and biological metrics were calculated from the data using the newest multimetric macroinvertebrate (MMI) protocols (Jessup et al. 2005, Feldman 2006). Metric results were then scored using the Montana DEQ bioassessment criteria and each sample categorized as non-impaired or impaired according to threshold values (Table 3).

The impairment threshold set by MT DEQ is **37** for the Eastern Plains Stream Index, and **48** for the Low Mountain/Valley Index, thus any scores above this threshold are considered unimpaired. The macroinvertebrate MMI score is based upon a series of metrics that measure attributes of benthic macroinvertebrate communities regarding condition changes to a stream system (in the form of anthropogenic caused changes).

## **Sites**

All sites chosen for this BLM watershed assessment lie within the Billings Field Office Management Area in Carbon Co., MT. Habitat assessments, water quality measurements, macroinvertebrate and/or fish surveys were to be performed at 10 predetermined lotic (stream) sites (per conversation with J. Platz) and an additional 2 spring-influenced sites within the BLM lands of the Watershed Assessment Region. Five of the apriori stream sites (Dillworth (2), Gold and Wolf Creek (2) as well as 5 other randomly visited sites were dry, so additional sites on BLM lands were added (Table 1).



All streams with water present had macroinvertebrate samples taken (see Methods). Four of the eight sites sampled for fish had fish present. Biological community integrity was calculated at all sites using Fish Observed/Expected Models (O/E), since Fish Integrated Biotic Indices (IBI's) have not been sufficiently developed for these mountain foothill streams and would rank impaired with the Prairie Fish IBI. Macroinvertebrate multi-metrics (MT DEQ MMI's) were calculated for all sites. Site summary descriptions based on the overall community integrity and site observations are included.

**Table 1.** BLM Clark's Fork Yellowstone 2007 aquatic sites. Sites with an asterisk (\*) were also sampled or a nearby reach was visited by NHP or DEQ in 2004, 2005.

BLM CFY Aquatic Sites	HUC	Latitude	Longitude	Date Sampled	Water Flow Condition
*Bear Creek	10070006	45.14233	-109.04185	30-Jul-07	water flowing
Bear Creek #2	10070006	45.16391	-109.11028	12-Jun-07	water flowing bankfull
*Clarks Fork					
Yellowstone River #1	10070006	45.26390	-108.91147	30-Jul-07	water flowing
*Clarks Fork					
Yellowstone River #2	10070006	45.10600	-109.02470	30-Jul-07	water flowing
Cottonwood Creek	10070006	45.08825	-108.81350	12-Jun-07	drying, recently wetted
Dillworth Creek #1	10070006	45.04714	-109.10140	13-Jun-07	dry
Dillworth Creek #2	10070006	45.05402	-109.13330	13-Jun-07	dry
Gold Creek Spring	10070006	45.07695	-109.18938	13-Jun-07	trickle spring flow
Gold Creek	10070006	45.07704	-109.18826	13-Jun-07	trickle flow
*Grove Creek	10070006	45.07616	-109.08412	12-Jun-07	trickle flow
Gyp Spring	10070008	45.00563	-108.42960	12-Jun-07	water flowing
North Fork Grove Creek	10070006	45.09573	-109.17846	13-Jun-07	water flowing, recently filled
Sage Creek	10080014	45.00929	-108.62682	13-Jun-07	water flowing, recently filled
South Fork Bridger Creek	10070006	45.21127	-108.84092	14-Jun-07	water flowing
South Fork Bridger Creek Spring	10070006	45.20484	-108.82200	14-Jun-07	water flowing
*Silvertip Creek #1	10070006	44.99972	-108.90290	12-Jun-07	water flowing bankfull
*Silvertip Creek #2	10070006	45.08825	-108.81350	12-Jun-07	water flowing bankfull
Wolf Creek	10070006	45.10889	-109.03973	12-Jun-07	dry
Wolf Creek trib	10070006	45.11668	-108.81350	12-Jun-07	dry

## **Results Summary**

The Clark's Fork of the Yellowstone River study area is a typical example of a sage-dominated Montana Foothills/ Wyoming Basin landscape transitioning to Northwestern Great Plains grasslands. We identified fish and macroinvertebrate communities with moderate ecological integrity within 3 Aquatic Ecological System Types (AES) during this study: Intermountain Transitional River (B003), Small Foothills Streams (C001), and Northwestern Great Plains/Wyoming Basin Perennial Spring Perennial (S005). But significant environmental factors exist in this region (ex. oil and gas fields, water diversions, improper grazing practices) to render other aquatic ecological system types in an impaired biological health condition (Silvertip, South Fork Bridger and Grove Creeks).

**Habitat Evaluations.** Overall, 3 of the 13 visited lotic sites had good habitat quality ranked by at least one of the habitat assessment methods (Table 2). Five of the 13 sites were ranked slightly impaired and five moderately to severely impaired. Highest site habitat scores using both the EPA RBP and BLM habitat assessment methods were measured at Sage Creek, Bear Creek and North Fork Grove Creek sites. Highest deductions to the riparian assessment scores were in stream sediments, bare ground and bank trampling by cattle intrusions into the riparian zone. These intrusions were specifically measured using the Livestock Use Index (LUI), which was very high for multiple streams including South Fork Bridger, Cottonwood, Wolf and Grove Creeks. High sediment loading was measured at both Silvertip Creek Sites, Grove and South Fork Bridger Creek. The water conductivity values taken at both Silver Tip Creek sites and Clark's Fork Yellowstone Site #1 were above the threshold ( $>3,000\mu\text{s}$ ) for the water quality impairment level (DEQ 2006) (Table 2).

**Fish Communities.** Overall, 3 native fish species, the longnose dace (*Rhinichthys cataractae*), longnose and white suckers (*Catostomus catostomus* and *C. commersoni*), were identified from only 64 individuals from the 13 lotic BLM sites sampled for fish in 2007 (Table 4). Although, the Clark's Fork of the Yellowstone (which was not sampled) is reported to contain 4-6 species of fish in the Bridger Creek section (MFISH 2006). Fish presence and individual numbers were lower than expected, and could have been caused by recent high water events leading to redistribution of existing populations, or in the case of Sage Creek having only recently been recolonized from a dry stream reach. Average fish species richness per site was  $<1$  (fish present sites-2.4), and the most diverse sites were the Bear Creek reach and South Fork Bridger Creek with 3 native species present. Longnose dace were collected at 100% (5 of 5) of the fish presence sites and white suckers at 4 of the 5. Using the O/E Models, 3 of the 5 fish sites were ranked non-impaired (good biological integrity), 1 was slightly impaired (moderate integrity) and the 1 spring site (South Fork Bridger Spring) is questionable, because this stream type is usually fishless. We consider the stream reaches of Grove Creek and both sites of Silvertip Creek moderate-severely impaired (poor biotic integrity), because these stream types should contain fish, but none were collected. This impairment (shown in the MMI) is manifested by an absence of the expected fish species.

**Macroinvertebrate Communities:** Overall, 112 macroinvertebrate taxa were reported from the BLM 2007 assessment sites (Appendix A). Average macroinvertebrate taxa richness per site was 22, and the highest taxa richness reported at 2 sites was 32 taxa. Using the Montana DEQ multimetric index (MMI), 9 of the 13 sites were ranked non-impaired (good to excellent

biological integrity), 3 were slightly impaired and 1 was severely impaired (Table 3). Silvertip Creek had severe impairment close to the Wyoming border and showed improvement as it proceeded ~4 miles downstream to the next sampling site. This downstream reach has seen improvement in the macroinvertebrate community in the 3 years since DEQ last sampled there, MMI scores 31.2 (2004) to 52.4 (2007) (Table 3). At most stream sites with previous sample events, MMI scores were in agreement from when they were sampled 3 years prior. One site that has significantly degraded is the Grove Creek Site, we visited this site in 2005 and MMI scores ranked the macroinvertebrate community with high biological integrity, but the 2007 sample ranks this site as having an impaired macroinvertebrate community. By visual observation, it has been significantly degraded by cattle and appears to have much lower flows than in the same time period during the 2005 visit.

Community results from the habitat, fish and macroinvertebrate surveys combined to rank the following sites from highest biological integrity to lowest within their aquatic ecological classification codes:

***Overall Aquatic Ecological System Site Condition (in order of highest integrity to worst by AES):***

**Intermountain Transitional River** (AES B003)-1) Clark's Fork of the Yellowstone River Bridger Bend (Site #2) & 2) Clark's Fork of the Yellowstone River (Site #1)

**Small Transitional Foothills River** (AES C001)-1) Bear Creek 2) Sage Creek, 3) South Fork Bridger Creek, 4) Grove Creek

**Small Foothills Stream** (AES D001)-1) North Fork Grove Creek, 2) Gold Creek, & 3) Dillworth Creek

**Northwestern Great Plains Intermittent Prairie Stream**-(AES code D005)-1) Wolf Creek, 2) Cottonwood Creek 3) Silvertip Creek Site #2, 4) Silvertip Creek Site #1

**Northwestern Great Plains/Wyoming Basin Perennial Spring** (AES code S005)- 1) Gyp Spring, 2) Bridger Creek Spring, 3) Gold Creek Spring,

## **Acknowledgements**

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**Table 2.** Site habitat and WQ parameters for aquatic sites included in the BLM surveys LUI=Livestock Use Index, Cond=Conductivity, % fines averaged across all transects. Bolded readings represent values exceeding DEQ water quality impairment standards.

Site	Date Sampled	Avg wetted width (m)	Avg channel depth (cm)	Reach Length (m)	EPA Habitat Quality Index (HQI)	BLM Site Eval	LUI	% fines in reach	pH	Cond	DO (mg/L)	Water Temp (C)
*Bear Creek	30-Jul-07	2.5	20.2	150	182	22	7	5.0	7.7	456	10.1	13.6
Bear Creek #2	12-Jun-07	2.3	18.5	150	172	20	6	12.0	7.2	288	9.7	16.5
*Clarks Fork Yellowstone River #1	30-Jul-07	42.5	65.0	200	168	20	0	6.0	6.9	<b>4120</b>	5.2	23.1
*Clarks Fork Yellowstone River #2	30-Jul-07	58.5	75.0	300	170	21	3	6.0	7.6	2240	4.3	22.1
Cottonwood Creek	12-Jun-07	dry	dry	na	na	na	28	na	na	na	na	Na
Dillworth Creek #1	13-Jun-07	dry	dry	na	na	na	5	na	na	na	na	Na
Dillworth Creek #2	13-Jun-07	dry	dry	na	na	na	12	na	na	na	na	Na
Gold Creek Spring	13-Jun-07	1.8	5.0	25	160	20	0	20.0	7.9	110	5	15.1
Gold Creek	13-Jun-07	dry	dry	na	na	na	20	na	na	na	na	Na
*Grove Creek	12-Jun-07	2.6	17.2	150	144	16	22	20.0	8.0	123	10.5	15.7
Gyp Spring	12-Jun-07	2.8	10.5	100	172	22	0	16.0	7.9	327	10	9.7
North Fork Grove Creek	13-Jun-07	2.1	12.0	150	178	21	0	<1	7.1	180	12	8.6
Sage Creek	13-Jun-07	4.2	25.0	150	188	23	5	4.0	7.2	110	5	22.5
South Fork Bridger Creek	14-Jun-07	1.8	11.3	150	150	15	35	25.0	7.5	2020	8	16.3
South Fork Bridger Creek Spring	14-Jun-07	1.3	14.9	50	168	18	10	5.0	7.6	550	10	14.8
Silvertip Creek #1	12-Jun-07	1.1	55.0	150	116	14	4	91.0	7.9	<b>4390</b>	2.5	25.4
Silvertip Creek #2	30-Jul-07	2.0	35.8	150	127	15	18	78.0	8.1	<b>5590</b>	3.2	25.3
Wolf Creek	12-Jun-07	dry	dry	na	Na	na	33	na	na	na	na	na
Wolf Creek trib	12-Jun-07	dry	dry	na	Na	na	28	na	na	na	na	na



**Table 3.** Fish and macroinvertebrate metrics. LVAL/PL=Low mountain-valley or plains designation, MT MMI= Multimetric Macroinvertebrate Index and Observed/Expected (O/E) scores for the lotic study sites. Bold-underlined scores are good-excellent index scores, shaded grey represent fair-good local-reach conditions. Fish (+) = present, (-) = sampled no fish, NS = not sampled for fish.

BLM CFY Aquatic Sites	LVAL /PL	# Macro Species	MT MMI	FISH	# FISH Species	Fish O/E
Bear Creek	LVAL	30	<u>63.6</u>	+	3	<u>75%</u>
Bear Creek #2	LVAL	29	<u>63.9</u>	+	3	<u>75%</u>
Bear Creek (DEQ 2004)	LVAL	25	<u>56.3</u>	+	NS	NS
Clarks Fork Yellowstone River #1	LVAL	32	<u>59.8</u>	+	NS	NS
Clarks Fork Yellowstone River #1 (DEQ Sept. 2004)	LVAL	30	<u>52.7</u>	+	NS	NS
Clarks Fork Yellowstone River #2	LVAL	31	<u>60.7</u>	+	NS	NS
Clarks Fork Yellowstone River 2 (DEQ Sept. 2004)	LVAL	29	<u>59.7</u>	+	NS	NS
Cottonwood Creek	PL	No inverts	0	dry	dry	0
Cottonwood Creek (DEQ 2004, private reach)	PL	24	<u>66.2</u>	NS	NS	NS
Dillworth Creek #1	LVAL	No inverts	0	dry	dry	0
Dillworth Creek #2	LVAL	No inverts	0	dry	dry	0
Gold Creek Spring	LVAL	7	<u>43.5</u>	▯	0	0
Gold Creek	LVAL	No inverts	0	dry	0	0
Grove Creek	LVAL	20	<u>42.4</u>	▯	0	0
Grove Creek (NHP 2005)	LVAL	22	<u>72.6</u>	NS	NS	NS
Gyp Spring	LVAL	32	<u>66.2</u>	▯	0	0
North Fork Grove Creek	LVAL	8	<u>72.6</u>	▯	0	0
Sage Creek	LVAL	0	0	+	2	<u>50%</u>
South Fork Bridger Creek	LVAL	10	<u>37.3</u>	+	3	<u>75%</u>
South Fork Bridger Creek Spring	LVAL	13	<u>56.9</u>	+	1	?
Silvertip Creek #1	PL	4	18.2	▯	0	0
Silvertip Creek1(DEQ 2004)	PL	8	27.5	NS	NS	NS
Silvertip Creek #2	PL	22	<u>52.4</u>	▯	0	0
Silvertip Creek2(DEQ 2004)	PL	19	31.4	NS	NS	NS
Wolf Creek	PL	No inverts	0	dry	dry	0
Wolf Creek trib	PL	No inverts	0	dry	dry	0

**Table 4.** Fish site species info. Seine (+) = additional seine hauls conducted or (++) full seining protocol used. \*Shallow enough to visually observe absence of fish.

BLM CFY Aquatic Sites	Shock Time (Sec)	Seine	Longnose Dace	White Sucker	Longnose Sucker	Total Individuals
Bear Creek	1580	+	4	2	1	7
Bear Creek #2	1390	+	8	2	2	12
Gold Creek & Gyp Spring*	0		0	0	0	0
Grove Creek	650		0	0	0	0
Grove Creek (NHP 2005)	600		0	0	0	0
North Fork Grove Creek	355		0	0	0	0
Sage Creek	1220		12	1	0	13
South Fork Bridger Creek	1098	+	22	4	1	27
South Fork Bridger Creek Spring	387		6	0	0	5
Silvertip Creek #1	687	++	0	0	0	0
Silvertip Creek #2	723	++	0	0	0	0

### **Site Descriptions: Intermountain Mainstem River (AES B005)**

#### **Management/Threats to this ecological system include:**

Grazing and livestock use around the riparian areas occurs and can have strong local effects resulting in sedimentation and stream widening at cattle crossings. Introductions of game or forage fish in stock ponds anywhere in the watershed can make their way downstream to these perennial prairie rivers and become permanent residents. Periodic Dewatering is a significant problem within the Clark's Fork of the Yellowstone tributaries and mainstem.

## **Clark's Fork Yellowstone (Mainstem Site #1 above Bridger Creek)**

**Location:** Accessed from bridge crossing and proceeded upstream ~50m to the first riffle/pool set designated the top of the reach. **Nearest Town: Bridger**

**Ecoregion:** Wyoming Basin/Northwestern Great Plains (Typical)

**Aquatic Ecological System Type:** B003-Intermountain Transitional River.

**Key Environmental Factors:** Hydrology--upstream diversions in the watershed; Riparian Grazing--no immediate impacts, Riparian Modifications--mod. impacts from riprap (left photo, upstream--river right)

**Rare or Unique Species:** No rare species, but a fairly intact & diverse intermountain macroinvertebrate assemblage. **Rare Features:** None

**Introduced/Exotic Aquatic Species:** Extensive stand of Russian olive trees upstream of reach.

Introduced fish---Rainbow and Brown Trout reported in this reach (FWP MFISH)

**Overall Ecological Site Condition: Fair**



**Reach Summary:** The 300m reach consisted of 1 riffle/run/pool complex with run geomorphology dominating the reach (200m) averaging 0.6m in depth. The lowermost pool was ~50m long, averaged 1m deep and contained the most fish holding habitat. This stream reach lacked a diversity of microhabitats, cobbles dominated the substrate (70% of transects) and lacked undercut banks or large woody debris. The substrate of the pool was gravel/pebble dominated with some silt and cobbles. Aquatic geomorphic features, riparian vegetation and overhanging banks provided the most significant stream fish habitat in this reach. Vegetation coverage along the riparian stream channel was dominated by grasses/shrubs and largely intact. Livestock use index (LUI) was low with 0 cow pies counted on a 75m walk of both left and right banks.

**Reach Riparian Ranking: BLM= 84% (20 of 24) EPA RBP= 83.3% (168 of 200)**

**Reach Riparian Geomorphology:** The geomorphology of this stream a riffle-pool configuration with substrate dominated by cobble/gravel and ranging to pebble/silt-dominated pools. Wetted width of the reach was 42.5 m. Surrounding bank materials are finer than the channel bed materials.

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**Fish were not sampled at this site.** Although, longnose dace were captured while sampling for macroinvertebrates, and Rainbow and Brown Trout were reported in this reach (FWP MFISH). Expected fish species for this stream type would also include longnose, mountain and white suckers

**Fish Community Quality: NA**

**Macroinvertebrate Community Quality: MTMMI= 59.8**

## **Clark's Fork Yellowstone (Bridger Bend FAS Mainstem Site #2)**

**Location:** Accessed from FWP Fishing Access parking lot and proceeded upstream ~100m to demarcate the top of reach and 300m downstream designated the bottom of the reach (Photo Looking Downstream).

**Ecoregion:** Wyoming Basin/Northwestern Great Plains (Typical)

**Aquatic Ecological System Type:** B003-Intermountain Transitional River.

**Key Environmental Factors:** Hydrology--upstream dams or diversions in the watershed; Riparian Grazing--slight impacts right bank, Riparian Modifications--slight impacts from road riprap, river left (Left Photo)

**Rare or Unique Species:** No rare spp., but a fairly intact intermountain macroinvertebrate assemblage.

**Rare Features:** None

**Introduced/Exotic Aquatic Species:** Rainbow and Brown Trout, Russian Olive Trees

**Overall Ecological Site Condition:** Fair-Good



**Reach Summary:** The 300m reach consisted of 1 long riffle/run/pool complex with riffle geomorphology dominating the reach (200m) averaging 0.25m in depth (see photos). The lowermost pool was ~50m long, averaged 1m deep and contained the most fish holding habitat. This stream reach lacked a diversity of microhabitats, cobbles dominated the substrate (80% of transects) and lacked undercut banks or large woody debris. The substrate of the pool was pebble dominated with some silt and cobbles. Vegetation coverage along the riparian stream channel was dominated by grasses/shrubs and largely intact. Livestock use index (LUI) was low with 0 cow pies counted on a 75m walk of both left and right banks.

**Reach Riparian Ranking:** BLM= 75% (18 of 24) EPA RBP= 85% (170 of 200)

**Reach Riparian Geomorphology:** The geomorphology of this stream a riffle-pool configuration with substrate dominated by cobble/gravel and ranging to pebble/silt-dominated pools. Wetted width of the reach was 58.5m. Surrounding bank materials are finer than the channel bed materials.

**Fish were not sampled at this site.** Although, longnose dace were captured while sampling for macroinvertebrates, and Rainbow and Brown Trout were reported in this reach (FWP MFISH). Expected fish species for this stream type would also include longnose, mountain and white suckers

**Fish Community Quality:** NA      Macroinvertebrate Community Quality: MTMMI= 60.7



## **Bear Creek (Sites 1 & 2--BLM & State Section)**

**Location:** Off highway 308, 2-3 miles west of Belfry

**Ecoregion:** Wyoming Basin Sage Foothills trending to Northwestern Great Plains

**Aquatic Ecological System Type:** C001-Small Transitional Foothills River

**Key Environmental Factors:** Hydrology--upstream diversions in tributaries of the watershed;

Riparian Grazing—slight to moderate impacts,

**Rare or Unique Species:** No rare species, but abundant *Ophiogomphus severus* Dragonfly larvae

**Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** Extensive stand of Russian olive trees within and upstream of reach

**Overall Ecological Site Condition:** Fair trending to Good



### **Reach Summary:**

This stream reach has moderate quality instream aquatic habitat and good fish species diversity (3 fish species). Substrate was dominated by gravel/pebble in the runs and the pools were gravel/silt dominated. Aquatic vegetation and overhanging banks provided the most significant stream habitat and shading in this stream reach. Livestock use index (LUI) was slight to moderate with 7 and 6 cow pies counted on a 75 m walk of each reach. Pugging and hummocking was minimal.

**Riparian Ranking:** BLM= #1-92% (22 of 24) / #2-80% (20 of 24) EPA RBP=#1- 91% (182 of 200)  
#2- 86% (172 of 200)

**Reach Riparian Geomorphology:** The geomorphology of this stream reach is a Rosgen F-4 with a gentle-medium slope (1.5 %), moderate sinuosity, a run-dominated configuration with substrate dominated by pebble/gravels and silt embedded pools. Pools are slightly incised and averaged >30 cm in depth, wetted width of the reach was 2.5. Surrounding bank materials are similar to the channel bed materials indicating a balance of sediment accumulation locally and upstream in the reach.

### **Fish Community:**

Three fish species were shocked in the 2 reaches of stream (150m--2 riffle/run/pool sequences). Dominant species were the longnose dace, longnose and white suckers. Expected fish for this stream type have almost been met, just missing the mountain sucker and potentially the flathead chub.

**Fish Community Quality:** O/E= 3/4 or 75% of the expected fish community

**Macroinvertebrate Community:** This community is dominated by the Medium Coolwater Transitional Assemblage (#1, Stagliano 2005) and members of the Small Foothills Transitional Assemblage (#9, Stagliano 2005). (#105, Stagliano 2005) Over 80% of the indicator species were present in this sample.

**Macroinvertebrate Community Quality:** Reach #1-MMI= 63.6 #2- MMI= 63.9

## **Cottonwood Creek (dry)**

**Location:**

**Ecoregion:** Pryor/Bighorn Mountain Foothills----Northwestern Great Plains

**Montana Foothills and Valleys**

**Aquatic Ecological System Type:** D005-Northwestern Great Plains Intermittent Stream

**Key Environmental Factors:** Hydrology--upstream dams or diversions in tributaries of the watershed; Riparian Grazing—moderate impacts,

**Rare or Unique Species:** No rare species

**Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** None collected.

**Overall Ecological Site Condition:** Fair trending to Good



**Reach Riparian Ranking:** BLM= NA      EPA RBP= NA

**Reach Geomorphology:** Surrounding bank materials are finer than the channel bed materials

**Fish Community:** No fish species collected, stream reaches dry. Expected fish for this stream type have not been met.

**Fish Community Quality:** IBI= 0      O/E= 0 / 2.7 or 0% of the expected fish community

**Macroinvertebrate Community:** No macroinvertebrate species collected stream reaches dry.

**Macroinvertebrate Community Quality:** MMI= 0      O/E= 0%

## **Sage Creek (BLM Bear Canyon Section)**

**Location:** Shoshone drainage, just upstream of Bear Canyon Creek near town of Warren

**Ecoregion:** Wyoming Basin Foothills trending to Northwestern Great Plains

**Aquatic Ecological System Type:** C001-Small Foothills River

**Key Environmental Factors:** Hydrology—recently refilled channel, upstream dams or diversions in tributaries of the watershed; Riparian Grazing—slight impacts,

**Rare or Unique Species:** No rare species

**Rare Features:** No colonized aquatic macroinvertebrates yet, really strange—fish moved in within days.

**Introduced/Exotic Aquatic Species:** None documented

**Overall Ecological Site Condition:** Fair trending to Good



**Fish Community:** 2 pioneering fish species (Longnose Dace and White Suckers) were shocked in the 2 riffle/run/pool sequences.

**Fish Community Quality:** O/E= 2/4 or 50% of the expected fish community

**Macroinvertebrate Community:** This macroinvertebrate community was absent, it had not recolonized the dry stream bed yet. 0 % of the indicator species were present in this sample.

**Macroinvertebrate Community Quality:** MT MMI= 0

## **South Fork Bridger Creek (BLM site)**

**Ecoregion:** Northwestern Great Plains / Wyoming Basin Foothills

**Aquatic Ecological System Type:** C001-Small Transitional Foothills River

**Key Environmental Factors:** 1) Grazing—moderate to high impacts in the immediate riparian (see right photo, cattle crossing). 2) Hydrology--upstream dams or diversions in tributaries of the watershed;

**Rare or Unique Species:** No rare species

**Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** Invasive *Orconectes virilis* crayfish in the reach.

**Overall Ecological Site Condition:** Fair trending to Poor

**Reach Summary:** The 150 m reach consisted of a G4 incised stream channel with a cattle crossing at the bottom of the reach. Upstream from this crossing the riparian vegetation (shrubs & grasses) is largely intact on both banks with old cattle damage recovering, but still showing moderate impacts on the upper end of the reach. Silt and other fine sediment deposits have eliminated much of the geomorphic fish holding habitat in this stream reach. Cobbles are moderately embedded.



**Cattle in a dry stream bed on N. Cherry Creek tributary to South Fork Bridger Creek**

**Fish Community:** 3 fish species were shocked or seined in the 2 riffle/run/pool sequences.

**Fish Community Quality:** O/E= 3/4 or 75% of the expected fish community

**Macroinvertebrate Community:** This community is dominated by the Medium Coolwater Transitional Assemblage (#1, Stagliano 2005) and members of the Small Foothills Transitional Assemblage (#105, Stagliano 2005). Over 60% of the indicator species were present in this sample.

**Macroinvertebrate Community Quality:** MT MMI= 37.3



## **Silvertip Creek #1 (upstream WY border site)**

**Location:** Accessed from Silvertip road on the east side of stream at BLM parcels.

**Ecoregion:** Northwestern Great Plains / Wyoming Basin Foothills

**Aquatic Ecological System Type:** D005-Northwestern Great Plains Intermittent Stream

**Key Environmental Factors:** Oil and gas deposits in the sediments, oil and gas drilling upstream, Hydrology--upstream dams or diversions in tributaries of the watershed; Grazing—low impacts,

**Rare or Unique Species:** No rare species

**Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** None documented

**Overall Ecological Site Condition:** Poor, Seriously Degraded (Toxic and Anoxic)



**Reach Summary:** The 150 m reach consisted of a G6 incised stream channel with recently flooded wetted mud from a rain storm event ~1 week prior. Silt and other fine sediment deposits have eliminated most of the geomorphic fish holding habitat in this stream reach. Riparian vegetation (grasses, sedges) is largely intact on both banks with old cattle damage recovering, but there are still moderate impacts on the upper end of the reach. Livestock use index (LUI) was slight-moderate with ~ 5 cow pies counted on a 75m walk of the left and right bank. Pugging and hummocking was extensive at one upper site of the reach. No amphibians or reptiles were noted while walking the reach, although a prairie rattlesnake, *Crotalus viridis* was spotted on the terrace above the stream.

**Reach Riparian Ranking:** BLM= 63.5% (14 of 24)    EPA RBP= 62.5% (116 of 200)

**Fish Community:** No fish species were shocked or seined in the 2 riffle/run/pool sequences.

**Fish Community Quality:** IBI= 0    O/E= 0/4 or 0% of the expected fish community

**Macroinvertebrate Community:** This community of intermittent prairie stream invertebrates consists of a severely impaired Prairie Pool assemblage (#12, Stagliano 2005). Only (4spp. collected) 5% of the indicator species were present in this sample.

**Macroinvertebrate Community Quality:** MT MMI= 18.2



## **Silvertip Creek #2 (downstream bridge site)**

**Location:** Accessed from Silvertip road on the east side of stream at BLM parcels.

**Ecoregion:** Northwestern Great Plains / Wyoming Basin

**Aquatic Ecological System Type:** D005-Northwestern Great Plains Intermittent Stream

**Key Environmental Factors:** Oil and gas deposits in the sediments, oil and gas drilling upstream, Hydrology--upstream dams or diversions in tributaries of the watershed; Grazing—low impacts,

**Rare or Unique Species:** No rare species

**Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** No exotic species documented

**Overall Ecological Site Condition:** Poor, Seriously Degraded (Toxic and Anoxic, Petrol Smell)



### **Reach Summary:**

The 150 m reach consisted of a G6 incised stream channel with recently flooded wetted mud from a rain storm event ~1 week prior (left photo). Silt and other fine sediment deposits have eliminated most of the geomorphic fish holding habitat in this stream reach. Riparian vegetation (grasses, sedges) is



largely intact on both banks with old cattle damage recovering, but there are still moderate impacts on the upper end of the reach. Livestock use index (LUI) was moderate to severe with ~18 old cow pies counted on a 75m walk of the left and right bank. Pugging and hummocking was extensive at one upper site of the reach. No amphibians or reptiles were noted while walking the reach. The sediments are anoxic and toxic. All substrate of the pools was silt dominated with some gravel/pebble in the runs between them; the lower pools contain some pebble/cobble riffle areas between them, which provided the highest habitat diversity for macroinvertebrates. The surrounding vegetation dominated by *Scirpus sp.* (rushes) and *Eleocharis palustris*, the common spikerush.

**Reach Riparian Ranking:** BLM= 63.5% (15 of 24) EPA RBP= 62.5% (127 of 200)

**Fish Community:** No fish species were shocked or seined in the 2 riffle/run/pool sequences.

**Fish Community Quality:** IBI= 0 O/E= 0/4 or 0% of the expected fish community

**Macroinvertebrate Community:** This community of intermittent prairie stream invertebrates consisted of the Prairie Pool assemblage (#12, Stagliano 2005) and the Prairie Stream assemblage found in the cobble riffle areas (#9, Stagliano 2005). Over 80% of the indicator species were present in this sample.

**Macroinvertebrate Community Quality:** MT MMI (2004) = 31.4 (2007) = 52.4

## **Grove Creek (BLM Section)**

**Location:** Approximately 4 miles west on Grove Creek Rd. off of Rt 72, BLM section

**Ecoregion:** Northwestern Great Plains / Wyoming Basin

**Aquatic Ecological System Type:** D005-Northwestern Great Plains Intermittent Stream

**Key Environmental Factors:** Hydrology--upstream dams or diversions in tributaries of the watershed;  
Grazing—moderate to severe impacts, pocking and hummocking

**Rare or Unique Species:** No rare species      **Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** None documented

**Overall Ecological Site Condition:** Fair (2005) trending to Poor (2007)



**Fish Community:** No fish species were shocked in the 2 run/pool sequences. Lake chubs have been previously reported near this reach.

**Fish Community Quality:** IBI= 0    O/E= 0/4 or 0% of the expected fish community

**Macroinvertebrate Community:** This community of prairie stream invertebrates consisted of the Prairie Pool assemblage (#12, Stagliano 2005) and the Prairie Stream assemblage found in the woody debris cobble areas (#9, Stagliano 2005). Over 70% of the indicator species were present in the 2005 sample.

**Macroinvertebrate Community Quality:** MT MMI (2005) = 72.6 (2007) = 42.4

## **Gold Creek(dry)**

**Ecoregion:** Pryor/Bighorn Mountain Foothills----Northwestern Great Plains

**Montana Foothills and Valleys**

**Aquatic Ecological System Type:** D001-Small Foothills Stream

**Key Environmental Factors:** Hydrology--upstream dams or diversions in tributaries of the watershed;  
Riparian Grazing—moderate impacts,

**Rare or Unique Species:** No rare species      **Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** None collected.

**Overall Ecological Site Condition:** Fair trending to Poor

**Reach Riparian Ranking:** BLM= NA    EPA RBP= NA

**Fish Community:** No fish species collected, stream reaches dry. Expected fish have not been met.

**Fish Community Quality:** IBI= 0    O/E= 0 / 2.7 or 0% of the expected fish community

**Macroinvertebrate Community:** No macroinvertebrate species collected stream reaches dry.

**Macroinvertebrate Community Quality:** MMI= 0    O/E= 0%



## **North Fork Grove Creek**

**Location:** upper boundary of BLM getting near the FS, pure snowmelt

**Ecoregion:** Pryor / Bighorn Mountain Foothills

**Aquatic Ecological System Type:** D001-Small Foothills Stream

**Key Environmental Factors:** Hydrology--upstream dams or diversions in tributaries of the watershed;  
Riparian Grazing—moderate impacts,

**Rare or Unique Species:** No rare species

**Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** None collected.

**Overall Ecological Site Condition:** Good



**Reach Summary:** The 150 m reach appears to be flowing with pure snowmelt run-off, as no fish have colonized recently; macroinvertebrate diversity and numbers are low as well. Livestock use index (LUI) was minimal with ~2 old cow pies counted on a 75m walk of the left and right bank..

**Reach Geomorphology:** The geomorphology of this stream is a riffle run configuration with a moderate slope (~2%), moderate sinuosity. Substrate is dominated with cobbles some gravel/pebble in the slower runs between them; the lower pools contain pebble/cobble riffle areas between them

**Reach Riparian Ranking:** BLM= 87.5% (21 of 24) EPA RBP= 90.5% (178 of 200)

**Fish Community:** No fish species were shocked in the 150 m reach sequence.

**Fish Community Quality:** IBI= 0 O/E= 0/4 or 0% of the expected fish community

**Macroinvertebrate Community:** This community of coldwater stream invertebrates consisted of the Mountain Stream assemblage (#90, Staglano 2005), but in really low numbers reflecting recent colonization of a dry stream bed. Only 25% of the indicator species were present in this sample, but the MMI still ranked this site as an excellent biological integrity.

**Macroinvertebrate Community Quality:** MT MMI= 72.6

## **Dillworth Creek(sites #1 & 2 dry)**

**Ecoregion:** Pryor/Bighorn Mountain Foothills----Northwestern Great Plains

**Montana Foothills and Valleys**

**Aquatic Ecological System Type:** D001-Small Foothills Stream

**Key Environmental Factors:** Hydrology--upstream dams or diversions in tributaries of the watershed;  
Riparian Grazing—moderate impacts,

**Rare or Unique Species:** No rare species   **Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** None collected.

**Overall Ecological Site Condition:** Fair trending to Good

**Reach Riparian Ranking:** BLM= NA    **EPA RBP= NA**

**Reach Geomorphology:** Surrounding bank materials are finer than the channel bed materials

**Fish Community:** No fish species collected, stream reaches dry. **Fish Community Quality:** IBI= 0  
O/E= 0 / 2.7 or 0% of the expected fish community

**Macroinvertebrate Community:** No macroinvertebrate species collected stream reaches dry.

**Macroinvertebrate Community Quality:** MMI= 0    O/E= 0%

## **Wolf Creek (sites #1 & 2 dry)**

**Location:** Accessed by traveling west (3-4 miles) off Route 72 from the road across from Bridger Bend FAS (photo right looking upstream). Below the reservoir confluence wolf creek

**Nearest Town:** Belfry

**Ecoregion:** Northwestern Great Plains—Pryor/Bighorn Foothills

**Aquatic Ecological System Type:** D005-Northwestern Great Plains Intermittent Stream

**Key Environmental Factors:** Hydrology—dry stream bed. Upstream dams or diversions in tributaries of the watershed; Grazing—moderate impacts, some hummocking, especially around the stock pond

**Rare or Unique Species:** No rare species    **Rare Features:** No rare features documented

**Introduced/Exotic Aquatic Species:** No aquatic species collected, stream reaches dry

**Overall Ecological Site Condition:** Fair trending to Poor



**Reach Riparian Ranking:** BLM= NA    **EPA RBP= NA**

**Reach Geomorphology:** Surrounding bank materials are finer than the channel bed materials

**Fish Community:** No fish species collected, stream reaches dry. Expected fish for this stream type have not been met.

**Fish Community Quality:** IBI= 0    O/E= 0 / 2.7 or 0% of the expected fish community

**Macroinvertebrate Community:** No macroinvertebrate species collected stream reaches dry.

**Macroinvertebrate Community Quality:** MMI= 0    O/E= 0%



## **Gyp Spring**

**Ecoregion:** Wyoming Basin (Typical)

**Aquatic Ecological System Type:** S005-Wyoming Basin Perennial Spring

**Key Environmental Factors:** Hydrology--upstream dams or diversions affecting groundwater recharge for the spring watershed; Grazing--slight impacts, mostly fenced-but some intrusions

**Rare or Unique Species:** An oasis of a biologically healthy spring community of aquatic insects within a desert landscape **Rare Features:** A spring oasis.

**Introduced/Exotic Species:** None documented

**Overall Ecological Site Condition:** Good



**Reach Riparian Ranking:** BLM= 91.6% (22 of 24) EPA RBP= 86% (172 of 200)

**Fish Community:** No fish species collected or expected.

**Fish Community Quality:** IBI= 0 O/E= 0 / 0 or 0% of the expected fish community

**Macroinvertebrate Community:** The macroinvertebrate community is consisted with a Northwestern Great Plains/Wyoming Basin Perennial Spring Assemblage resembling species found in other springs in the region.

**Macroinvertebrate Community Quality:** MMI= 66.5

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Appendix A. Macroinvertebrate Species by site for the 2007 BLM Watershed Assessment.

Site_Name	Taxon	Individuals
Bear Creek	Agabus	3
Bear Creek	Baetis intercalaris	2
Bear Creek	Baetis tricaudatus	6
Bear Creek	Cricotopus bicinctus gr.	7
Bear Creek	Dicranota	2
Bear Creek	Dubiraphia	1
Bear Creek	Ephemerella excrucians	88
Bear Creek	Gammarus	1
Bear Creek	Haliphus	1
Bear Creek	Helichus lithophilus	2
Bear Creek	Heptagenia	2
Bear Creek	Hexatoma	1
Bear Creek	Hydropsyche confusa	52
Bear Creek	Hydropsyche morosa gr.	11
Bear Creek	Isoperla	23
Bear Creek	Limnephilus	1
Bear Creek	Micropsectra	5
Bear Creek	Nectopsyche	1
Bear Creek	Ophiogomphus severus	15
Bear Creek	Optioservus	13
Bear Creek	Paramerina	1
Bear Creek	Parametriocnemus	1
Bear Creek	Physella	3
Bear Creek	Polypedilum	5
Bear Creek	Probezzia	2
Bear Creek	Thienemannimyia gr.	6
Bear Creek	Tipula	1
Bear Creek	Tricorythodes minutus	2
Bear Creek	Tubificidae	2
Bear Creek	Tvetenia bavarica Gr.	22
Bear Creek #2	Agabus	3
Bear Creek #2	Baetis intercalaris	2
Bear Creek #2	Baetis tricaudatus	6
Bear Creek #2	Cricotopus	25
Bear Creek #2	Cricotopus bicinctus gr.	7
Bear Creek #2	Dicranota	2
Bear Creek #2	Dubiraphia	1
Bear Creek #2	Ephemerella excrucians	44
Bear Creek #2	Gammarus	1
Bear Creek #2	Haliphus	1
Bear Creek #2	Helichus lithophilus	2
Bear Creek #2	Heptagenia	2
Bear Creek #2	Hexatoma	1
Bear Creek #2	Hydropsyche confusa	52
Bear Creek #2	Hydropsyche morosa gr.	11
Bear Creek #2	Isoperla	12
Bear Creek #2	Nectopsyche	1
Bear Creek #2	Odontomesa	1
Bear Creek #2	Ophiogomphus severus	15
Bear Creek #2	Optioservus	13
Bear Creek #2	Parametriocnemus	1

Bear Creek #2	Physella	3
Bear Creek #2	Polypedilum	5
Bear Creek #2	Probezzia	2
Bear Creek #2	Thienemannimyia gr.	4
Bear Creek #2	Tipula	1
Bear Creek #2	Tricorythodes minutus	4
Bear Creek #2	Tubificidae	2
Bear Creek #2	Tvetenia bavarica Gr.	22
Clarks Fork Yellowstone River #1	Acentrella turbida	14
Clarks Fork Yellowstone River #1	Arctopsyche grandis	2
Clarks Fork Yellowstone River #1	Atherix pachypus	2
Clarks Fork Yellowstone River #1	Baetis tricaudatus	7
Clarks Fork Yellowstone River #1	Brachycentrus occidentalis	15
Clarks Fork Yellowstone River #1	Cardiocladius	10
Clarks Fork Yellowstone River #1	Cheumatopsyche	71
Clarks Fork Yellowstone River #1	Choroterpes albiannulata	2
Clarks Fork Yellowstone River #1	Cinygma	2
Clarks Fork Yellowstone River #1	Cricotopus bicinctus gr.	2
Clarks Fork Yellowstone River #1	Ephemerella aurivillii	30
Clarks Fork Yellowstone River #1	Heptagenia elegantula	3
Clarks Fork Yellowstone River #1	Hexatoma	5
Clarks Fork Yellowstone River #1	Hydropsyche californica	22
Clarks Fork Yellowstone River #1	Hydropsyche morosa gr.	52
Clarks Fork Yellowstone River #1	Hydroptila	8
Clarks Fork Yellowstone River #1	Lebertia	1
Clarks Fork Yellowstone River #1	Microtendipes	4
Clarks Fork Yellowstone River #1	Nematoda	1
Clarks Fork Yellowstone River #1	Oecetis	1
Clarks Fork Yellowstone River #1	Optioservus quadrimaculatus	1
Clarks Fork Yellowstone River #1	Paraleptophlebia bicornuta	1
Clarks Fork Yellowstone River #1	Phaenopsectra	8
Clarks Fork Yellowstone River #1	Physella	1
Clarks Fork Yellowstone River #1	Polypedilum	3
Clarks Fork Yellowstone River #1	Protanyderus	1
Clarks Fork Yellowstone River #1	Simulium	1
Clarks Fork Yellowstone River #1	Siphonurus	1
Clarks Fork Yellowstone River #1	Skwala	1
Clarks Fork Yellowstone River #1	Stempellinella	1
Clarks Fork Yellowstone River #1	Tanytarsus	1
Clarks Fork Yellowstone River #1	Thienemannimyia gr.	2
Clarks Fork Yellowstone River #1	Tricorythodes minutus	64
Clarks Fork Yellowstone River #1	Tubificidae	2
Clarks Fork Yellowstone River #1	Zaitzevia parvula	2
Clarks Fork Yellowstone River #2	Acentrella turbida	12
Clarks Fork Yellowstone River #2	Arctopsyche grandis	1
Clarks Fork Yellowstone River #2	Atherix pachypus	2
Clarks Fork Yellowstone River #2	Baetis tricaudatus	11
Clarks Fork Yellowstone River #2	Brachycentrus occidentalis	22
Clarks Fork Yellowstone River #2	Cardiocladius	8
Clarks Fork Yellowstone River #2	Cheumatopsyche	45
Clarks Fork Yellowstone River #2	Choroterpes albiannulata	4
Clarks Fork Yellowstone River #2	Cricotopus bicinctus gr.	2
Clarks Fork Yellowstone River #2	Ephemerella aurivillii	12



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Clarks Fork Yellowstone River #2	Heptagenia elegantula	1
Clarks Fork Yellowstone River #2	Hexatoma	2
Clarks Fork Yellowstone River #2	Hydropsyche californica	12
Clarks Fork Yellowstone River #2	Hydropsyche morosa gr.	76
Clarks Fork Yellowstone River #2	Hydroptila	8
Clarks Fork Yellowstone River #2	Isoperla	1
Clarks Fork Yellowstone River #2	Lebertia	1
Clarks Fork Yellowstone River #2	Microtendipes	4
Clarks Fork Yellowstone River #2	Nematoda	1
Clarks Fork Yellowstone River #2	Oecetis	1
Clarks Fork Yellowstone River #2	Optioservus quadrimaculatus	2
Clarks Fork Yellowstone River #2	Paraleptophlebia bicornuta	1
Clarks Fork Yellowstone River #2	Phaenopsectra	8
Clarks Fork Yellowstone River #2	Physella	2
Clarks Fork Yellowstone River #2	Polypedium	3
Clarks Fork Yellowstone River #2	Simulium	1
Clarks Fork Yellowstone River #2	Stempellinella	4
Clarks Fork Yellowstone River #2	Tanytarsus	5
Clarks Fork Yellowstone River #2	Thienemannimyia gr.	2
Clarks Fork Yellowstone River #2	Tricorythodes minutus	44
Clarks Fork Yellowstone River #2	Tubificidae	2
Clarks Fork Yellowstone River #2	Zaitzevia parvula	2
Gold Creek Spring	Fossaria humilis	5
Gold Creek Spring	Hesperophylax designatus	2
Gold Creek Spring	Laccobius	3
Gold Creek Spring	Limnephilus	3
Gold Creek Spring	Ormosia	5
Gold Creek Spring	Parametriocnemus	2
Gold Creek Spring	Tubificidae	6
Grove Creek	Agabus	28
Grove Creek	Clinocera	7
Grove Creek	Coenagrion/Enallagma	2
Grove Creek	Cricotopus bicinctus gr.	50
Grove Creek	Dicrotendipes	18
Grove Creek	Fossaria	2
Grove Creek	Hyalella azteca	4
Grove Creek	Hydrobius	1
Grove Creek	Larsia	3
Grove Creek	Micropsectra	199
Grove Creek	Nematoda	11
Grove Creek	Odontomesa	71
Grove Creek	Orthocladius	28
Grove Creek	Parakiefferiella	12
Grove Creek	Paratanytarsus	9
Grove Creek	Phaenopsectra	10
Grove Creek	Procladius	5
Grove Creek	Psilometriocnemus	16
Grove Creek	Rheocricotopus	17
Grove Creek	Simulium	86
Grove Creek	Stictochironomus	5
Grove Creek	Tvetenia bavarica Gr.	125

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Gyp Spring	Agabus	17
Gyp Spring	Argia	61
Gyp Spring	Baetis tricaudatus	27
Gyp Spring	Bezzia/Palpomyia	8
Gyp Spring	Caloparyphus	5
Gyp Spring	Cricotopus	5
Gyp Spring	Culicoides	5
Gyp Spring	Dicranota	6
Gyp Spring	Euparyphus	12
Gyp Spring	Helophorus	1
Gyp Spring	Hesperophylax designatus	29
Gyp Spring	Hydroporus	20
Gyp Spring	Hydroporus sp.2	9
Gyp Spring	Hydropsyche confusa	1
Gyp Spring	Limnephilus	4
Gyp Spring	Limnophila	1
Gyp Spring	Optioservus quadrimaculatus	4
Gyp Spring	Orthocladius	5
Gyp Spring	Ostracoda	1
Gyp Spring	Pagastia	8
Gyp Spring	Parakiefferiella	31
Gyp Spring	Polypedilum	1
Gyp Spring	Probezzia	3
Gyp Spring	Psilometriocnemus	5
Gyp Spring	Sweltsa	1
Gyp Spring	Tabanus	4
Gyp Spring	Tanytarsus	5
Gyp Spring	Thienemanniella	1
Gyp Spring	Trichocorixa	1
Gyp Spring	Tubificidae	2
Gyp Spring	Tvetenia bavarica Gr.	10
North Fork Grove Creek	Diamesa	3
North Fork Grove Creek	Dipheter hageni	3
North Fork Grove Creek	Euparyphus	2
North Fork Grove Creek	Micropsectra	2
North Fork Grove Creek	Orthocladius (Euorthocladius)	6
North Fork Grove Creek	Probezzia	1
North Fork Grove Creek	Radotanypus	2
North Fork Grove Creek	Tubificidae	5
Silvertip Creek #1	Chironomus	7
Silvertip Creek #1	Cricotopus bicinctus gr.	5
Silvertip Creek #1	Oreodytes	1
Silvertip Creek #1	Tubificidae	2
Silvertip Creek #2	Buena	3
Silvertip Creek #2	Callibaetis ferrugineus	48
Silvertip Creek #2	celina	1
Silvertip Creek #2	Coenagrion/Enallagma	35
Silvertip Creek #2	Corixidae	22
Silvertip Creek #2	Cricotopus	5
Silvertip Creek #2	Cricotopus bicinctus gr.	4
Silvertip Creek #2	Dineutus	4

Silvertip Creek #2	Dolichopodidae	1
Silvertip Creek #2	Hetaerina americana	2
Silvertip Creek #2	Hydraphantidae	1
Silvertip Creek #2	Hydroporus	1
Silvertip Creek #2	Illybius	8
Silvertip Creek #2	Laccophilus	12
Silvertip Creek #2	Libellula	3
Silvertip Creek #2	Odontomesa	2
Silvertip Creek #2	Ostracoda	90
Silvertip Creek #2	Procladius	2
Silvertip Creek #2	Protanypus	1
Silvertip Creek #2	Simulium	4
Silvertip Creek #2	Tabanus	3
Silvertip Creek #2	Tanytarsus	3
South Fork Bridger Creek	Argia	5
South Fork Bridger Creek	Baetis tricaudatus	4
South Fork Bridger Creek	Cricotopus bicinctus gr.	4
South Fork Bridger Creek	Hydropsyche confusa	25
South Fork Bridger Creek	Hydropsyche morosa gr.	3
South Fork Bridger Creek	Ophiogomphus severus	23
South Fork Bridger Creek	Orconectes virilis	25
South Fork Bridger Creek	Polypedilum	2
South Fork Bridger Creek	Simulium	44
South Fork Bridger Creek	Tubificidae	7
South Fork Bridger Spring	Argia	66
South Fork Bridger Spring	Baetis tricaudatus	1
South Fork Bridger Spring	Choroterpes albiannulata	2
South Fork Bridger Spring	Hydropsyche confusa	23
South Fork Bridger Spring	Hydropsyche morosa gr.	5
South Fork Bridger Spring	Nemotelus	1
South Fork Bridger Spring	Ophiogomphus severus	78
South Fork Bridger Spring	Orconectes virilis	1
South Fork Bridger Spring	Parakiefferiella	1
South Fork Bridger Spring	Physella	4
South Fork Bridger Spring	Protzia	1
South Fork Bridger Spring	Simulium	4
South Fork Bridger Spring	Sphaerium	2